

Abstract

A VCSEL having improved diffraction loss,  
comprising a series of deposited material layers  
comprising the structure of the VCSEL, and an  
5 intracavity lens formed in one of the series of  
deposited material layers. In one preferred form of  
the invention, the VCSEL comprises a bottom mirror  
mounted to the top of a substrate; a bottom spacer  
mounted to the top of the bottom mirror; a gain region  
10 mounted to the top of the bottom spacer; a top spacer  
mounted to the top of the gain region; and a top mirror  
mounted to the top of the top spacer, such that a  
reflective cavity is formed between the bottom mirror  
and the top mirror; with at least one of the bottom  
15 mirror, bottom spacer, gain region, top spacer and top  
mirror containing a superlattice structure, and with an  
adjacent region being subjected to ion implantation and  
rapid thermal annealing so as to disorder the  
superlattice structure and change its index of  
20 refraction, whereby to create an intracavity lens so as  
to reduce diffraction loss.